

REMARKS

Claims 24-26 and 29-31, as amended, remain herein. Claims 27, 28, and 32-34 are pending but are withdrawn from consideration.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "Version with Markings to Show Changes Made."

A new title, "Method Of Manufacturing A Circuit Board and Semiconductor Device" has been provided as required.

A replacement Abstract of the Disclosure has been provided also.

Claims 26 and 31 have been amended to add the feature "first groove having a bottom surface."

1. Claims 25, 26, 29 and 31 were objected to because "a" is included in the preamble, instead of "the." Applicants respectfully submit that the central theme, i.e., "a printed circuit board" of the preamble of dependent claims should agree with that of the independent claim from which they depend. There is no necessary or reason to make the recommended change. For example, claim 24 recites "A method for manufacturing a circuit board...", and accordingly, claim 25, which depends from claim 24, recites "The method for manufacturing a circuit board..." Claim 25

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is merely a "shorthand" form of claim 24, and therefore, should recite the same central theme. Applicants respectfully submit that the indicated change is unnecessary.

Claim 26 has been amended to replace the word "additionally" with "further." Claims 26 and 31 have been amended to replace the word "desired" to "predetermined."

Claim 29 has been amended to add "first" after the phrase "plurality of" and to add "second" after "the" in line 5.

Reconsideration and withdrawal of this objection is respectfully requested.

2. Claim 26 was rejected under 35 U.S.C. §112, second paragraph, as indefinite for reciting the phrase "the board." The Office Action contains an assertion that the specification indicates that the conductive material is transferred to the substrate to form the circuit board, and on that basis, the Examiner recommends replacing "the board" with "the substrate" in claim 26. Applicants respectfully disagree because the specification, page 7, last paragraph bridging to page 8, describes conductive material 24 as filling grooves 22 and 23 and then is transferred onto board 11. Moreover, the chosen wording reflects the desired scope of claim 26.

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Reconsideration and withdrawal of this rejection is respectfully requested.

3. Claims 24-26 and 29-31 were rejected under 35 U.S.C. §103(a) over Mohri et al. U.S. Patent 6,132,543 and Covell II et al. U.S. Patent 5,718,367.

The presently claimed invention is directed to a method of manufacturing a circuit board including a plurality of wiring patterns and a plurality of protrusions located at desired locations on the wiring patterns on a substrate, wherein the wiring patterns and protrusions are simultaneously and unitarily formed. This arrangement is nowhere disclosed or suggested in any of the cited references considered alone or in combination.

Mohri '543 is cited to show formation of wiring patterns on a circuit board by casting the wiring patterns in a substrate and transferring them to a board, and then coupling the wiring patterns to electrodes of a semiconductor device.

The Office Action admits that Mohri '543 does not disclose simultaneous forming of protrusions and wiring patterns.

Covell '367 is cited to show a method of preparing solder pillars by filling through-holes with solder, heating/melting the solder and solidifying the solder by cooling; these steps are

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followed by drawing out the solder pillars from the through-holes. The Office Action contains an allegation that the body and pads of the solder pillars correspond to applicants' claimed protrusions and wiring patterns.

One skilled in the art, applying the teachings of Covell '367 to the method of Mohri '543, would necessarily include the heating/melting step and the cooling step so that the pillars of solder are formed. These heating/melting and cooling steps are absolutely necessary to pillar formation, i.e., "protrusions," and cannot be eliminated.

The method of claims 24 and 29 does not include the steps of heating/melting and cooling of the filled conductors in the groove. Those steps occur after the conductive material is transferred, and form no part of claims 24 and 29. Therefore, even if one skilled in the art were to combine the teachings of Covell '367 with the method of Mohri '543, the result would not be anything like the method of the presently claimed invention.

Neither Mohri '543 nor Covell '367 teach or suggest the benefits or desirability of simultaneously and unitarily forming wiring patterns and protrusions, as claimed. Therefore, nothing in the prior art of record would prompt one skilled in the art to make

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such a combination without benefit of knowledge of applicants' claims.

Regarding claims 26 and 31, it is alleged that Mohri '543 discloses forming a first groove on a film, filling conductive material into the first groove, transferring the filled conductive material to the substrate 1, and firing it. The Examiner admits that Mohri '543 does not disclose forming a second groove at a predetermined location on the first groove.

It is also asserted that Covell '367 discloses forming a second groove (locations 70, 72 in mold 53) at a predetermined location in the first groove (location 71 in mold 53). Covell '367, FIGS. 2-6, show a sequence of forming solder pillars 70 by introducing conductive material into a top opening of mold 53 and later withdrawing the formed pillars out of a bottom opening of filled mold 75, wherein the pillar includes a mounting pad and wiring portion, said to correspond to applicants' first and second groove. Thus, Covell '367 requires a groove to be a through-hole having top and bottom openings.

Claims 26 and 31, as amended, now require "the first groove having a bottom surface." Therefore, the through-hole arrangement and method of Covell '367 cannot be applied to Mohri '543 to give

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a method similar to the claimed method. The second groove (locations 70 and 72 in mold 53) and first groove (location 71 in mold 53) of Covell '367 do not correspond to applicants' first groove having a bottom surface and second groove at a predetermined location in the first groove.

For all the foregoing reasons, there is no disclosure or teaching in either of Mohri '543 or Covell '367 that would suggest applicants' claimed invention. Nor is there any disclosure or a teaching in either of these references which would suggest the desirability of combining any portions thereof effectively to suggest the claimed invention. For all the reasons stated above, claims 25 and 26 which depend from claim 24, and claims 30 and 31, which depend from claim 29, are likewise allowable. Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

All claims 24-26 and 29-31 are now proper in form and patentably distinguished over all grounds for rejection cited in the Office Action. Accordingly, allowance of all claims 24-26 and 29-31 is respectfully requested.

Should the Examiner deem that any further action by the applicants would be desirable to place this application in even

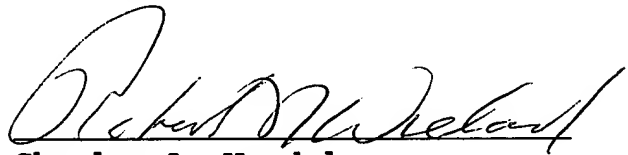
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better condition for issue, he is requested to telephone applicants' undersigned representatives. If the only barrier to allowance is the presence of non-elected claims 27, 28, and 32-34, the Examiner is authorized to cancel those claims for that express purpose.

Respectfully submitted,

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Attachment: Version with Markings to
Show Changes Made

Attorney Docket No.: MEIC:053A

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

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IN THE CLAIMS:

24. (Amended) A method of manufacturing a circuit board comprising a plurality of wiring patterns and a plurality of protrusions [disposed] located at desired locations on the wiring patterns on a substrate, wherein said method comprises simultaneously and unitarily forming the wiring patterns and the protrusions.

26. (Amended) The method of manufacturing a circuit board as defined in Claim 25 [additionally] further comprising:

forming a first groove on a film, the first groove having a bottom surface;

forming a second groove at a [desired] predetermined location in the first groove;

filling conductive material into the first and the second grooves;

transferring the filled conductive material to the board; and
firing the transferred conductive material.

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29. (Amended) A method of manufacturing a semiconductor device comprising:

(a) simultaneously and unitarily forming a first plurality of wiring patterns and a second plurality of protrusions at desired locations on the wiring patterns on a circuit board; and

(b) coupling electrically the protrusions on said circuit board and electrodes on a semiconductor chip component.

31. (Amended) The method of manufacturing a semiconductor device as defined in Claim 30 wherein forming the wiring patterns and the protrusions of the same conductive material comprises:

forming a first groove on a film, the first groove having a bottom surface;

forming a second groove at a [desired] predetermined location in the first groove;

filling conductive material into the first and the second grooves;

transferring the filled conductive material onto the circuit board; and

firing the transferred conductive material.